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Photograph by Branson De Cou from Galloway

SLOW TRAIN THROUGH VIGO CARRIES A CARGO OF ICE CREAM

Young Galicians like ices just as young Americans do. To attract their trade, the young "engineer" transports ice cream in refrigerated drawers of a miniature locomotive cab. This peddler's novelty is also a symbol; Galicians have traveled far to colonize the New World. But the Galicia from which South America's settlers came is in Spain, not in Poland (Bulletin No. 4).

HOW TEACHERS MAY OBTAIN THE BULLETINS

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New Boundaries for a Shorn Finland

THE peace treaty concluded between Finland and the U. S. S. R. on March 13 altered Finland's boundary and reduced its size in four places—the extreme southwest, the extreme northeast, the east just above the Finnish "waistline," and the southeast. The Russian frontier is now similar to that drawn in 1721. Preliminary estimates indicate that losses may equal about one-tenth of the country's area, one-eleventh of its industries, and the second largest city, Viipuri.

The changes give to Russia the use, by virtue of a thirty years' lease, of the strategic Hangö peninsula for the establishment of a naval base on Finland's southwestern tip. The farthest north change moves the northernmost extremity of the U. S. S. R.-Finnish frontier westward to give to Russia the Finnish half of the Sredni and Rybachi peninsulas, projecting into the Arctic Ocean beyond Petsamo. These vital northern and southern spots, although involving the transfer of a minimum of area, nevertheless are important for their location overlooking Finland's shipping lanes. Exports from the rich Canadian-owned nickel mines of the Petsamo region would have to pass the Sredni and Rybachi peninsulas.

Arctic Railroad to Link with Swedish and Russian Lines

The Hangö peninsula is an ideal stand for patrolling traffic through the Gulf of Bothnia, the Baltic, and the Gulf of Finland as well. Past the peninsula of Hangö and through the Gulf of Finland must go most foreign shipping to Leningrad, the western port of the U. S. S. R., and for Helsinki, Finland's capital.

One treaty provision foreshadowed a railroad from the U. S. S. R.'s White Sea port of Kandalaksha across the frontier into Finland, to the town of Kemijarvi. At present Kemijarvi is the northeastern terminus of a line running to the Gulf of Bothnia port of Kemi, and from there connecting with a Swedish railroad. Kemijarvi also connects with the Arctic Highway, which reaches the Arctic Ocean.

East of Kemijarvi, the new frontier gives to the U. S. S. R. a slice of thinly populated Arctic Finland, including the region around Kuolajarvi. This community lies on the present highway between Kemijarvi and the Russian border, and on the direct line between Kandalaksha and Kemijarvi, over which the projected railroad will be built. In addition to giving greater Russian control over the future line, the boundary change protects the Murmansk-Leningrad Railroad, Soviet Russia's west Arctic lifeline, formerly less than 50 miles from the Finnish frontier.

Industrial Section for Exports Around Lake Ladoga Lost

The greatest loss to Finland, in area, population, sentimental value, and wealth, is the surrender of the entire Karelian Isthmus, of the shores of Lake Ladoga, and of the city of Viipuri. The Karelian Isthmus includes the Mannerheim Line of fortifications. This westward alteration of the Russo-Finnish frontier puts Leningrad about 80 miles inside the border, instead of the former 25 miles. Islands in the eastern Gulf of Finland, near Leningrad, become Russian. Ladoga, Europe's largest lake, becomes entirely Russian.

This southeastern amputation deprives Finland of much of her share of Karelia, the forested lake-dotted region in which most of the folk songs were collected to form the Finnish national epic, the *Kalevala*.

This is the lower edge of a drainage basin, which pours the lake waters and timber of southeasternmost Finland to sawmills, paper mills, and factories along Ladoga's shores. The rich Lake Saimaa region nourishes Viipuri's trade. In the shipping of lumber, cellulose, paper, plywood, and pulpwood—constituting more

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Photograph by Maynard Owen Williams

TOSSING RICE AROUND IN JAVA MEANS PAY DAY, NOT WEDDING DAY

After working in rice all summer, workers from the rice fields are paid in rice at the end of the season. Each worker stacks up her harvest of small sheaves of the still unthreshed grain. The foreman, under the eye of the police (left), divides the crop: one-fifth to the government for taxes, one-fifth to the worker, and three-fifths to the landlord. The Javanese farmerette never wears overalls, but a bright sarong and a long-sleeved jacket. For protection against the tropical sun, she dons a filmy scarf worn shawlwise, or turbanwise around her head, and tops it with a conical lampshade hat (Bulletin No. 2).

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Netherlands Indies Question Haunts Homeland and Japan

WITH treaty-making and treaty-unmaking currently in the air, Japan has notified the Netherlands that the arbitration treaty between the two nations will expire next August. The Japanese Empire on the outer edge of Asia and the Netherlands, wedged into western Europe, have little direct contact, but between them lies the long, fabulously rich necklace of emerald islands strung along the Equator—the Netherlands Indies.

These tropical islands, noted as the home of sarongs and dragon lizards, spices and orang-utans and batiks (illustration, next page), are five times as distant from their European mother country as from Japan. The several hundred islands between Asia and Australia stretch over a region as long as Europe, with their eastern lands some 2,000 miles due south of Japan. Of their natural wealth of rubber and tin, oil and copra, sugar and coffee, Japan is one of the four leading importing nations; the foremost, of course, is the Netherlands.

Wealth Shifts from Spices to Oil, Rubber, and Tin

These lush islands are the godmother of the Western Hemisphere, since the quest for a short cut to their riches brought Columbus to the western isles which he named Indies likewise. After formation of the Dutch East India Company in 1602, trade with the East Indies also fostered the exploration of Australia.

The Molucca group, once called the Spice Islands, were long famous for the cloves and nutmegs of Amboina and Ternate. The tack-shaped cloves were considered essential to baked meats, candy, pickles, and fragrant pomander balls. The nutmegs were so prized that they inspired a profitable racket in wooden imitations. In Celebes, the port of Macassar was the source of Macassar hair oil against which mid-Victorian housewives knitted antimacassars for their furniture. Mace and cinnamon, black pepper and white were widely shipped from Sumatra for Oriental incense, Occidental kitchens, and sachet bags.

The islands that were once looked to for all that was fragrant or flavorful now have a more modern rôle. About one-fifth of the exported wealth of the Indies is in the form of petroleum. Rubber now constitutes a tenth of the export values. The islands of Banka and Billiton share in the tin deposits which, to the north, give British Malaya one of the richest concentrations of the world's tin. Coffee from Africa, tobacco from North America, and cinchona (for quinine) from South America are recent plant immigrants that are now more valuable than the spice crops. The "silk-cotton" fiber from the kapok tree, now used for stuffing mattresses and pillows, is another newcomer to the Indies export lists. The islands retain their old pre-eminence for pepper, and have become the chief world source for kapok and quinine.

Java More Crowded than the Netherlands

From forests and gardens they have shipped to the United States as much as 73,000,000 pounds of pepper, in addition to mustard seed, mace, cinnamon, cassia, nutmeg, cloves, and vanilla beans. Their other principal exports across the Pacific to Uncle Sam have been tea, crude rubber, straw hats, tin, sisal and kapok fibers, goat and kid skins. The United States is second to the Netherlands as a market for the products of the Netherlands Indies.

The sixty million inhabitants of the Netherlands Indies, graceful brown-skinned people in sarong and handkerchief-turban, are scattered over islands total-

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than 80 per cent of the country's exportable wealth—Viipuri is prominent, although in size it is second to the capital city. The southern end of the important Saimaa Canal, between Viipuri and the town of Lappeenranta, is cut off by the new border. On the northern shores of Lake Ladoga are one of the leading metal smelting centers of the country, and some of the few deposits of iron ore. Felt mills, woolen mills, shoe factories, flour mills, and power plants are among the industries affected by the boundary shift.

Note: Readers who wish to review the course of the recently-ended Russo-Finnish War in their GEOGRAPHIC NEWS BULLETINS are referred to: "Vital Viipuri, Chief Soviet Objective in East Finland," March 11, 1940; "Finnish Battlefields Beside Ladoga, Europe's Largest Lake," March 4, 1940; "The 'Waistline' Sector of Finland's Fighting Front," February 26, 1940; "Turku Now Finland's Leading Winter Port," February 19, 1940; "Finland's Karelian Isthmus Is Europe's 'Hottest' Battleground," January 29, 1940; "War Loss Closes Finland's Back Door to the Ice-Free Arctic," January 8, 1940; and "United States Befriends Friendly Finland," October 30, 1939. See also "Flashes from Finland" in the *National Geographic Magazine* for February, 1940; and "Farthest-North Republic," October, 1938.

Bulletin No. 1, April 1, 1940.

Photograph by Marvin Breckinridge

LAND OF FINNISH LAPPS HAS NEW BOUNDARIES

In the northern section of Finland, where new boundaries give the U. S. S. R. part of the Sredni and Rybachi peninsulas, the principal inhabitants were at one time nomadic Lapps, following the migrations of their reindeer herds. New developments, such as the Petsamo nickel mines, have brought outsiders into the region. Meanwhile, many of the Lapps have settled down in permanent homes in the northern forests, fishing and following agricultural pursuits in the brief summers. With such modern gadgets as a meat grinder, the Lapp woman still uses an old spinning wheel. The older woman's shoes have the characteristic turned-up toes of all Lapp footgear, to hold ski-straps in place.

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Egypt's Fortified "Backdoor" Opens on Italian Libia

THE recent diplomatic tug of war between Great Britain and Italy over Italian imports of German coal has had light repercussions in Africa. Reinforcements and newspaper correspondents moved to a fortified frontier where British and Italian forces stand face to face. The border is the 550-mile line through the Sahara, almost arrow-straight except at its northern end, which divides Egypt from Italy's North African colony of Libia. When an agreement was reached in Europe, the tension relaxed also in Africa.

On the Egyptian side of the border, the defenses are lined up mainly in an east-west line, as successive steps in strengthening the communications lines along the coast. The coastal highway and railroad lead to Alexandria, the western outpost of the fertile Nile delta. An invasion from the west would have to pass Alexandria before penetrating the Nile valley to Cairo, or pushing east to the Suez Canal.

Egypt's Military Highway over Ancient Roman Route

The vital highway connecting Alexandria with the desert fortress of Matruh, 150 miles to the west, was completed last year. It is a hard road paralleling the Mediterranean coastal beaches, connecting the villages of El Hamman, El Daba, and Fuka, then cutting across the uninhabited desert to Matruh. Beyond, for another 100 miles, the road is being surfaced on its westward stretch to the border.

This military highway of today follows the route of an ancient Roman *via*, over which Roman conquerors traveled to pleasant seaside bathing resorts. Matruh occupies the site of the old Roman city of Paraetonium, and Roman wells furnish the water supply today. In addition to concrete fortifications, the town has a resort hotel.

Peaceful picnickers and vacationists drive to Matruh from Alexandria, continue westward to Salum (the ancient Catabathmus Magna), or turn southward to the famous oasis of Siwa. Moslem desert dwellers in the walled city surrounding the oasis enjoy the business of a desert crossroads; three highways converge upon Siwa, and a caravan route crosses it, so that it is even more important now than when Alexander the Great journeyed there to consult the oracle of Jupiter Ammon. This is one of Egypt's six principal oases, and one of the oldest settlements in the desert. Because of its numerous springs and flourishing date palms, it is also one of the most prosperous. Mud houses surrounded by thick mud walls for protection hint of desert raids in the past, and of stalwart defense.

Egypt Ceded Oases to Libia

The Egyptian-Libian frontier crosses that eastern end of the Sahara known as the Libian Desert. From Siwa, it stretches southward for approximately 800 miles, a region of blinding sandstorms, of temperatures that vary from 110 degrees in the day to near freezing at night. Over this vast, sandy waste wind ancient caravan routes, still traveled by lines of swaying camels. The oases of the deep interior are visited only by explorers and the more determined of venturesome travelers who push on beyond where the pavement ends.

On the Libian side of the frontier also the desert extends, but the oases are richer. Those along the coast of eastern Libia are among the finest in North Africa, contributing to the success of the Italian settlements in Cirenaica. Italians cultivate dates and olives, and where there is irrigation, vegetables thrive. Chief settlement of the region is El Guarscia, six miles from the caravan center of Bengasi.

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ing 735,000 square miles in area, almost 60 times larger than that of the Netherlands. New Guinea, the largest island, is about the size of Japan proper. This island, and Borneo (which is five-sevenths under Netherlands rule), and Timor are shared with other powers. Sumatra, Java, Celebes, and Ceram are some of the larger areas under Dutch rule. More than half of the people of the Indies, however, live on fertile and carefully cultivated Java, though it has barely one-twentieth of the total area. The richness of this volcanic island has earned it the name of the Garden of the East, and its intensive agriculture is one of the world's prize exhibits of intelligent use of natural resources (illustration, inside cover).

In this granary of the Orient, where each blade of rice is planted by hand, the population pressure (817 per square mile) is higher than it is in the Netherlands (680). The other islands are by contrast almost empty (about 30 per square mile).

The Portuguese, who pioneered in navigation of the waters around the Indies, rounded the Cape of Good Hope of South Africa to take on spicy cargoes which justified the length of their voyages. Early Dutch explorers also rounded Africa and sailed more than 11,000 miles from the Netherlands to the tropical harbors of their island empire in the Orient. The Suez Canal shortened the distance and stimulated the trade. Now regularly scheduled airplanes from the Netherlands reach Batavia, in Java, in six days.

Note: See also "Bali and Points East," *National Geographic Magazine*, March, 1939; "Around the World for Animals," June, 1938; "Monkey Folk," May, 1938; "Modern Dragon Hunt on Komodo," September, 1936; "The Greatest Voyage in the Annals of the Sea" (Magellan's), December, 1932; "Among the Hill Tribes of Sumatra," February, 1930; "Through Java in Pursuit of Color," September, 1929; "Artist Adventures on the Island of Bali," March, 1928, and "The Columbus of the Pacific" (Cook), January, 1927.

The Netherlands Indies appear on the Society's Map of Asia, available on paper at 50¢ and on linen at 75¢ from The Society's Washington, D. C., headquarters.

Bulletin No. 2, April 1, 1940.

Photograph from Helmig

EAST INDIES BATIK HAS BECOME AN INTERNATIONAL ART FORM

Long before modern machines were invented to dye cloth in colored patterns, the patient women of the Netherlands Indies had a technique for it; they called it *batik*, Javanese for "painting in wax." Planning an intricate design of many colors, they cover the cloth with hot wax excepting the spots which are to be a given color; when the cloth is dipped in dye, all other portions are protected by the wax. Then the process is repeated, leaving unwaxed the spots which are to be dyed another color. These women of the island of Madura spread their batik frames in front of their homes.

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Two Galicias Behind Germany's Oil Quest

WHEN news came of German troops patrolling railroads through Galicia, readers might have asked, "Which Galicia?" One Galicia is a region of southern Poland, the other a province of northern Spain.

The Galicia of the moment is in Poland, sloping down the Carpathian mountains along the northern borders of Romania and Hungary over to Germany. Through it passes the German-policed railroad from the Romanian frontier over which Romanian oil travels to the Reich. The eastern part of this Galicia has extensive oil deposits. When Poland was divided in September, 1939, to Germany went the western section of Galicia, with its mining and industrial centers, and to Soviet Russia fell the eastern portion, with its oil.

Polish Region Named for Its Mountains or Its Salt

How did two Galicias develop almost at opposite ends of continental Europe? The Spanish province was called Kalaikia by far-traveling ancient Greeks, and an early geographer speaks of its people as Galatae. The Polish Galicia took its name from Halicz, a castle of Russian princes of the 12th and 13th centuries. First applied to the castle only, the term was later transferred to the neighboring town and finally to the whole region. Changes in pronunciation through 800 years of use for Halicz, more than 2,000 years for Kalaikia, have evolved both names into Galicia.

With their common name, any resemblance between the two regions ends. Poland's inland Galicia lies on the north side of the high mountain barrier at the very heart of central Europe, the Carpathians. This mountain chain, which bars any warm winds from the Mediterranean, gives Galicia its long severe winters and short hot summers, with possibly the most extreme temperatures of all Poland. About the size of South Carolina (some 30,000 square miles), it has a population of 7,500,000 people, more than four times that of the American State. Most are Poles and Ruthenians, chiefly farmers. Jews form an important minority.

The old name, Halicz, may have come from a word for "salt" or a similar word for "mountains"; the region has both. Despite the steep slopes of the mountains, however, and the primitive methods of the farmers in much of the district, Galicia produces good crops of wheat, rye, and corn, as well as sugar beets, flax, tobacco, and quantities of potatoes. Cattle, horses, goats, hogs, and poultry are raised. Bee culture, for wax and honey, is a flourishing industry. Even this productivity does not make the region a land of plenty, for the crowded population has difficulty in making one year's crop last until the next year's harvest.

Sardines and Chestnut-fattened Hogs in Spanish Galicia

While manufacturing is comparatively minor, Polish Galicia has factories whose output ranges from agricultural machinery to beer, leather goods to linen and hemp products. In the west are considerable deposits of iron, coal, zinc, and rock salt. Among Galicia's world-famous salt mines are those of Wieliczka, with its stalactite caverns, worked for centuries and once the chief source of revenue of Polish kings. In the Soviet-held east, especially around Drohobycz and Boryslaw, are the oil fields which placed Poland fourth among petroleum producers in 1938.

Spanish Galicia is the northwestern corner of Spain, contained between Portugal, the Atlantic, and the Bay of Biscay. Its 11,250-square-mile area is mountainous and sea-indented. Roman legions, lured by its gold and tin, entered the region in 137 B. C., and conquered it during the reign of Augustus. Since 813 A. D. it has had a shrine at Santiago de Compostela, sacred to the bones of Saint James.

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Since Italy acquired Libia from Turkey in 1912, the colony has extended its boundaries several times to include more arable land and valuable water sources. The year 1925 brought within Italian domination the fertile Giarabub oasis, ceded to Libia by Egypt. South of Giarabub lies the oasis of Cufra, which was the last stronghold of the Senussi (illustration, below), members of a once potent Moslem sect, whose power the Italians broke with airplanes and bombs in 1930-31. With the annexation of a southeast corner from Great Britain and Egypt in 1934, the colony acquired several springs in the Uweinat Mountains.

Note: Additional photographs and information about Egypt and its Libian Desert backdoor are found in "By Felucca Down the Nile," *National Geographic Magazine*, April, 1940; "Change Comes to Bible Lands," December, 1938; "Suez Canal: Short Cut to Empire," November, 1935; "Cirenaica, Eastern Wing of Italian Libia," June, 1930; "Flying Over Egypt, Sinai, and Palestine," September, 1926; "The Land of Egypt," March, 1926; "Cairo to Cape Town, Overland," February, 1925; "Crossing the Untraversed Libyan Desert," September, 1924.

See also the Classical Lands Map, and the map of Africa, copies of which are obtainable from The Society's Washington, D. C., headquarters at 50¢ (paper) and 75¢ (linen).

Bulletin No. 3, April 1, 1940.

Photograph by A. M. Hassanein Bey

THE WELL-DRESSED DESERT DWELLER IS WELL-WRAPPED

The thick walls (shown by depth of niche, upper left) of houses in oasis settlements are built to keep out heat. The Senussi sect of the Moslem religion, founded about a hundred years ago, has its headquarters in the small oasis of Giarabub. Here the founder of the sect is buried in a handsome domed mosque, and followers conduct a university for 500 students. Opposed to smoking or the use of intoxicants, the Senussi ban coffee. This Senussi sheik takes his afternoon refreshment from a tea tray, using glasses instead of cups. The box of white sugar loaf (left) contains a hammer also, for breaking off a lump. Although the Senussi renounce other luxuries, they sanction fine clothes. The sheik's voluminous costume includes garments of silk and soft wool. His shawl is a finely woven, handblocked print from India.

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Sun's "Halo" Eclipse To Be Observed by Expedition

THE moon will change the sun into a thin bracelet of light during the annular eclipse of April 7, and the National Geographic Society, in cooperation with the National Bureau of Standards, is sending observers to Texas to study the effects of the reduced sunlight on radio signals.

An annular eclipse is a medium-rare event, occurring less frequently than partial eclipses and more frequently than total eclipses. But no solar eclipse is commonplace, for, although two occur every year and sometimes there are five, the narrowness of their path across the face of the earth makes them visible to very few people. About 32 per cent of the 237 eclipses taking place, on an average, in each century are annular.

Nine-Tenths Covered, Sun Will Still Be Bright

In annular eclipses, the moon does not obscure the sun's face entirely, but leaves the rim visible as a dazzling ring (*annulus* in Latin) around the moon's silhouette.

In the passing and repassing of the moon and the earth in their waltz around the sun, the earth-moon-sun line-up periodically creates a solar eclipse, when the moon cuts off the sun's light from observers on the earth. The moon's path past the sun's blazing face may be central, when the center of one crosses the center of the other and obscures it. Or the moon may short-cut across a rim of the sun, never completely hiding it, and causing a partial eclipse. As the moon varies in its distance from the earth its apparent size varies. When the moon is close to the earth, and apparently large, it eclipses the sun totally, blotting out its light for a few minutes of artificial night. When the moon is farther from the earth, it appears smaller, and is not large enough to cover the sun. Then, a central path of the moon across the sun's face leaves the annulus visible.

From different spots on the earth's surface, a solar eclipse has different appearances. In a strip across the southern United States and northern Mexico, the neatly proportioned annulus will appear around the dark moon. To the north and to the south, the eclipse will appear as partial, with the moon giving the sun only lopsided coverage. That the moon is making a nick of some size in the sun's disc will be apparent from Panama to Alaska. At the height of the eclipse, in the path of greatest darkness, more than nine-tenths of the sun's diameter will be covered; but the brightness will still be much greater than the full moon's.

The annulus is not to be confused with the corona, which is visible only during the brief period of darkness of total eclipses. The corona consists of gas streaming out from the sun, illuminated by the sun's rays. The annulus is the sun's actual surface.

Layers of "Wounded" Molecules Make Radio Programs

An annular eclipse of March 21, in 424 B. C., is vaguely identified with one described by the Greek historian Thucydides. The British scientist Baily made his spectacular discovery of the light phenomenon known as Baily's Beads during an annular eclipse of 1836. Since then, annulars have not been left up to the casual attention of historians, but have been the objects of scientific observation.

Astronomers, who have about one minute per year, on the average, to observe eclipses, are always fearful that clouds may hide an eclipse and nullify their months of preparation and the many miles of travel usually necessary to reach eclipse paths. But clouds will make no difference to the National Geographic-Bureau of Standards observers. The radio waves by means of which their studies will be made will penetrate any clouds that may cover the sky and will travel to a high region of the atmosphere far above the clouds.

Two radio engineers will be in charge of the observations, using new mobile equipment mounted on an automobile trailer. They will travel to the vicinity of San Antonio, Texas, and measure changes occurring in the ionosphere of the earth's atmosphere.

The ionosphere is a region of concentration of "ions," the radio-reflecting layers from 30 to 250 miles above the earth's surface. Their existence was first speculated upon 50 years ago; now they are fairly well known, since the growth first of the wireless telegraph and later the radio telephone. Without these reflecting layers, the great radio industry could not operate as it is now conducted. Radio waves travel in nearly straight lines, and the direct waves would have only weak effects on receiving sets beyond the horizon. But the ionosphere, by reflecting radio signals, sends them bouncing to great distances beyond the horizon. In fact they pass entirely around the world, glancing back and forth between the ionosphere above and the earth below.

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Its mountain forests furnish acorns and chestnuts for fattening hogs. Fishermen, especially from the port of Vigo on the Atlantic (illustration, cover), make fine hauls of sardines, which are canned and exported. The port of Coruña is the leading city now, and capital of one of the provinces into which Galicia was subdivided a century ago. The other sub-provinces are Lugo, Orense, and Pontevedra. From this westward-facing, seagoing section of Spain, a heavy migration to the New World has settled large colonies of Galicians in Latin America.

Note: The two Galicias (Polish and Spanish) are described further in "Pedaling Through Poland," *National Geographic Magazine*, June, 1939; "Turbulent Spain," October, 1936; "Bright Bits in Poland's Mountainous South" (color insert), March, 1935; "Pursuing Spanish Bypaths Northwest of Madrid" and "Color Contrasts in Northern Spain" (color insert), January, 1931; "On the Bypaths of Spain," March, 1929; and "Struggling Poland," August, 1926.

Spanish Galicia and Polish Galicia may be located on The Society's Map of Central Europe and the Mediterranean, copies of which are available at 50¢ (paper) and 75¢ (linen).

Bulletin No. 4, April 1, 1940.

Photograph by Dorothy Hosmer

ALL GALICIA GOES TO MARKET IN SOUTHERN POLAND

Once a part of Austria, then of Poland, and now comprising the southeastern and southwestern corners of Germany and the U. S. S. R. respectively, the Galicia in Central Europe is chiefly agricultural. On the weekly market day at Nowy Targ, in the Carpathian Mountains, Galician farm products are brought to the market square in front of the Town Hall in one-horse wagons of wicker on a wooden framework. Livestock, cheeses, berries, and the family ride in on the same cushioning layer of hay. Rock salt in this salt-rich region arrives by the wagonload. Men wear characteristic round dark felt hats and homespun trousers with a stripe down the side. Women wear shawls and skirts of big plaids similar in pattern to their horse blankets.

Every radio listener has remarked the improvement of reception after nightfall. A similar change has been remarked during eclipses, when the sun's light is cut off not by nightfall but by the passage of the moon.

The ionosphere consists of several layers. Those best known have been labeled (from the earth up) the E layer, the F_1 layer and the F_2 layer. They consist of concentrations of ions or "mutilated" molecules of the gases that make up the air. The gas molecules become torn, and therefore electrified, from collisions with the billions of rays of sunlight that plow through on their way to the earth. When night falls, and sunlight no longer passes through the atmosphere, the "wounding" of molecules and creation of ions stops. Very quickly the lowest of the layers, the E layer, practically disappears, because the wounded molecules heal, or grow back to their normal condition. Gradually after sunset, the high layers, the F_1 and F_2 layers, also become less densely ionized. Radio signals reflected at night from the higher two layers are stronger and clearer, because they do not have to pass twice through the electrified region of the E layer of daytime, losing energy on the way.

The National Geographic-Bureau of Standards observers of the eclipse will measure the gradual alteration of these ionosphere layers during the progress of the eclipse. The trailer-mounted equipment, operated by storage batteries, will send upward radio signals of steadily increasing frequency. This frequency increase (or "shortening" of the radio "waves") will take place in one minute, and will be repeated over and over during the progress of the eclipse. The time required for the "echo" signals of the various frequencies to return from the reflecting layers at different stages of darkness will be recorded photographically. These tracings will show variations in the ionization density of the layers and in their heights. The observations may also throw light on processes occurring on the sun which determine the ionization of the earth's atmosphere.

Note: For additional material about eclipses of the sun see "News of the Universe," *National Geographic Magazine*, July, 1939; "Nature's Most Dramatic Spectacle" and "Eclipse Adventures on a Desert Isle," September, 1937; "Observing an Eclipse in Asiatic Russia," February, 1937; "Photographing the Eclipse of 1932 from the Air" and "Observing a Total Eclipse of the Sun," November, 1932.

Bulletin No. 5, April 1, 1940.

Photograph by Richard H. Stewart

ECLIPSE HUNTERS FOLLOW ONE STAR AROUND THE WORLD

To see the annular eclipse of April 7, scientists will have to go no farther than Texas and Mexico. For previous views of the brief moments of total eclipses, however, they have traveled much farther. The 14-foot aluminum camera used by Dr. Irvine C. Gardner on earlier eclipse expeditions sent out by the National Geographic Society and the National Bureau of Standards has gone through Germany into Siberia, as is evident from the "Handle With Care" labels painted on its packing case (lower right). Then it went to Canton Island in the Pacific for use during the June, 1937, total eclipse. Thus the sun, the closest of the stars, draws scientists across oceans and continents.

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